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EXAMINER	
FOX, BRYAN J	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/649,387	**Applicant(s)** NAKAYA ET AL.	
	Examiner Bryan J. Fox	**Art Unit** 2686	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 August 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-42 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 15-20 and 29-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Kezys (US006492942B1).

Regarding **claim 1**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating a set of weights for elements of each of the plurality of array antennas, the set of weights being such values as to allow each of the array antennas to function as an adaptive beam forming array antenna; a weights setting section for selecting a particular set of weights from the calculated sets of weights, and for applying

the particular set of weights from the calculated sets of weights, and for applying the particular weights in common to the plurality of array antennas, the particular set of weights being to be applied to an array antenna that has received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of weights are applied."

Regarding **claim 2**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating a set of weights for elements of each of the plurality of array antennas, the set of weights being such values as to allow each of the array antennas to function as an adaptive null-forming array antenna; a weights setting section for selecting a particular set of weights from the calculated sets of weights, and for applying the particular set of weights from the calculated sets of weights, and for applying the particular weights in common to the plurality of array antennas, the particular set of

weights being to be applied to an array antenna that has received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of weights are applied."

Regarding **claim 3**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating arrival angles of a desired wave and of a disturbing wave as the arriving waves for each of the plurality of array antennas; a weight setting section for selecting arrival angles of a desired wave and of a disturbing wave from the calculated arrival angles, and for applying a particular set of weights in common to the plurality of array antennas, the desired wave and disturbing wave being arrival waves with good channel quality as monitored by the channel quality monitoring section, the particular set of weights being such values as to allow each of the plurality of array antennas to have a main lobe in a direction of the arrival angle of the desired wave, and a null point

in a direction of the arrival angle of the disturbing wave," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of weights are applied."

Regarding **claim 4**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating arrival angles of a desired wave and of a disturbing wave as the arriving waves and a set of weights, the set of weights being such values as to allow each of the array antennas to function as an adaptive null-forming array antenna; a weight setting section for selecting, from the calculated arrival angles, arrival angles of a desired wave and of a disturbing wave as arrival waves with good channel quality as monitored by the channel quality monitoring section, for correcting one of the calculated sets of weights to such values as to allow an array antenna to have a main lobe in a direction of the arrival angle of the desired wave, and a null point in a direction of the

arrival angle of the disturbing wave and for applying the corrected set of weights in common to the plurality of array antennas, the array antenna having received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of weights are applied."

Regarding **claim 5**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of array antennas is composed of elements; and the elements of each of the array antennas are arranged on a same virtual line or plane parallel to each position of the plurality of array antennas."

Regarding **claim 6**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of array antennas is composed of elements; and the elements of each of the array antennas are arranged on a same virtual line or plane parallel to each position of the plurality of array antennas."

Regarding **claim 15**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring

section for monitoring channel quality of each of arriving waves that arrive at a plurality of aerial beam forming antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating a set of reactances for elements of each of the plurality of aerial beam forming antennas, the set of reactances being loaded on each of the elements of the aerial beam forming antennas; a reactance setting section for selecting a particular set of reactances from the calculated sets of reactances, and for applying the particular set of reactances in common to the plurality of aerial beam forming antennas, the particular set of reactances being loaded on an aerial beam forming antenna having received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of reactances are loaded."

Regarding **claim 16**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of aerial beam forming antennas." The output of the optimization computation is directed to control the reactances on the antenna so that the antenna is able to operate

in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating a set of reactances for elements of each of the plurality of aerial beam forming antennas, the set of reactances being loaded on each element of the aerial beam forming antennas and being such values as to allow each of the aerial beam forming antennas to function as an adaptive null-forming array antenna; a reactances setting section for selecting a particular set of reactances from the calculated sets of reactances, and for applying the particular set of reactances from the calculated sets of reactances, and for applying the particular reactances in common to the plurality of aerial beam forming antennas, the particular set of reactances being loaded on an aerial beam forming antenna having received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of reactances are loaded."

Regarding **claim 17**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of aerial beam forming antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in

high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating arrival angles of a desired wave and of a disturbing wave as the arriving waves for each of the plurality of aerial beam forming antennas; a reactance setting section for selecting arrival angles of a desired wave and of a disturbing wave from the calculated arrival angles, and for applying a particular set of reactances in common to the plurality of array antennas, the desired wave and disturbing wave being arrival waves with good channel quality as monitored by the channel quality monitoring section, the particular set of reactances being such values as to allow each of the plurality of aerial beam forming antennas to have a main lobe in a direction of the arrival angle of the desired wave, and a null point in a direction of the arrival angle of the disturbing wave," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of reactances are loaded."

Regarding **claim 18**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of aerial beam forming antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in

high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating, for each of the plurality of beam forming antennas, arrival angles of a desired wave and of a disturbing wave as the arriving waves and a set of reactances, the set of reactances being such values as to allow each of the aerial beam forming antennas to function as an adaptive null-forming array antenna; a reactance setting section for selecting arrival angles of a desired wave and of a disturbing wave from the calculated arrival angles, and for correcting one of the calculated sets of reactances to such values as to allow an aerial beam forming antenna to have a main lobe in a direction of the arrival angle of the desired wave, and a null point in a direction of the arrival angle of the disturbing wave and for applying the corrected set of reactances in common to the plurality of aerial beam forming antennas, the desired wave and the disturbing waves being arriving waves with good channel quality as monitored by the channel quality monitoring section, the aerial beam forming antenna having received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of array antennas to which the particular set of reactances are loaded."

Regarding **claim 19**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of aerial beam forming

antennas is composed of elements; and the elements of each of the aerial beam forming antennas are arranged on a same virtual line or plane parallel to each position of the plurality of array antennas."

Regarding **claim 20**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of aerial beam forming antennas is composed of elements; and the elements of each of the array antennas are arranged on a same virtual line or plane parallel to each position of the plurality of aerial beam forming antennas."

Regarding **claim 29**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of adaptive beam forming antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "weight setting section for selecting a particular set of weights from sets of weights which are to be loaded on the plurality of adaptive beam forming array antennas, and for applying the particular set of weights as corrected values in common to the plurality of adaptive beam forming array antennas, the particular set of weights being to be applied to an adaptive beam forming array antenna that has received an arriving wave

with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of adaptive beam forming array antennas."

Regarding **claim 30**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of adaptive null-forming array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "weight setting section for selecting a particular set of weights from the calculated sets of weights, and for applying the particular set of weights from sets of weights which are to be loaded on the plurality of adaptive beam forming array antennas, and for applying the particular set of weights as corrected values in common to the plurality of adaptive null-forming array antennas, the particular set of weights being applied to an adaptive null-forming array antenna that has received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section." Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of adaptive null-forming array antennas."

Regarding **claim 31**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of adaptive null-forming array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating arrival angles of a desired wave and of a disturbing wave as the arriving waves for each of the plurality of adaptive null-forming array antennas; a weight setting section for selecting arrival angles of a desired wave and of a disturbing wave from the calculated arrival angles, and for applying a particular set of weights as corrected values in common to the plurality of adaptive null-forming array antennas, the desired wave and disturbing wave being arrival waves with good channel quality as monitored by the channel quality monitoring section, the particular set of weights being such values as to allow each of the plurality of adaptive null-forming array antennas to have a main lobe in a direction of the arrival angle of the desired wave, and a null point in a direction of the arrival angle of the disturbing wave," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on the claimed, "combining section for combining arriving waves received with the plurality of adaptive null-forming array antennas."

Regarding **claim 32**, Kezys discloses an array antenna system where an optimization criterion is computed based upon the content of a received signal, such as a signal to noise ration (see column 5, line 40 – column 6, lines 8), which reads on the claimed, "radio communication apparatus comprising: a channel quality monitoring section for monitoring channel quality of each of arriving waves that arrive at a plurality of adaptive null-forming array antennas." The output of the optimization computation is directed to control the weights on the antenna so that the antenna is able to operate in high interference environments (see column 6, lines 9-25), which reads on the claimed, "computing section for calculating arrival angles of a desired wave and of a disturbing wave as the arriving waves for each of the plurality of adaptive null-forming array antennas; a weight setting section for selecting, from the calculated arrival angles, arrival angles of a desired wave and of a disturbing wave as arrival waves with good channel quality as measured by the channel quality monitoring section, for correcting a set of weights to be applied to an adaptive null-forming antenna to such values as to allow the adaptive null-forming array antenna to have a main lobe in a direction of the arrival angle of the desired wave, and a null point in a direction of the arrival angle of the disturbing wave, and for applying the corrected set of weights in common to the plurality of adaptive null-forming array antennas, the adaptive null-forming array antenna having received an arriving wave with maximum channel quality as monitored by the channel quality monitoring section," wherein changing the weights on the antenna array corresponds to changing the direction of the antenna array. Because the antennas are part of an array (see column 5, lines 32-57), their outputs are combined, which reads on

the claimed, "combining section for combining arriving waves received with the plurality of adaptive null-forming array antennas."

Regarding **claim 33**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of adaptive null-forming array antennas is composed of elements; and the elements of each of the adaptive null-forming array antennas are arranged on a same virtual line or plane parallel to each position of the plurality of adaptive null-forming array antennas."

Regarding **claim 34**, Kezys discloses that preferably, all of the antenna elements are mounted on a single structure, such as a planar square or disk (see column 9, lines 21-38), which reads on the claimed, "each of the plurality of adaptive null-forming array antennas is composed of elements; and the elements of each of the adaptive null-forming array antennas are arranged on a same virtual line or plane parallel to each position of the plurality of adaptive null-forming array antennas."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 7-14, 21-28 and 35-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kezys in view of Lindskog et al (US006738020B1).

Regarding **claims 7-10**, Kezys fails to expressly disclose feeding sections provided on feed lines of all or part of the plurality of array antennas, for employing a set of weights for transmitting a transmission wave via the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections provided on feed lines of all or part of the plurality of array antennas, for employing a set of weights for transmitting a transmission wave via the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves."

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claims 11-14**, Kezys fails to expressly disclose feeding sections for applying the particular set of weights to feeding line(s) of transmission array antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of array antennas is/are paired with the transmission array antennas.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections for applying the particular set of weights to feeding line(s) of transmission array antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of array antennas is/are paired with the transmission array antennas," wherein using the same values adjusted for frequency differences reads on the pairing.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claims 21-24,** Kezys fails to expressly disclose feeding sections provided on feed lines of all or part of the plurality of aerial beam forming antennas, for employing a set of reactances for transmitting a transmission wave via the feed line(s), the set of reactances being obtained by correcting the particular set of reactances in

accordance with frequency differences between the transmission wave and the arriving waves.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections provided on feed lines of all or part of the plurality of aerial beam forming antennas, for employing a set of reactances for transmitting a transmission wave via the feed line(s), the set of reactances being obtained by correcting the particular set of reactances in accordance with frequency differences between the transmission wave and the arriving waves."

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claims 25-28**, Kezys fails to expressly disclose feeding sections for applying the particular set of reactances to feeding line(s) of transmission aerial bema forming antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of aerial beam forming antennas is/are paired with the transmission aerial beam forming antennas.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections for applying the particular set of reactances to feeding line(s) of transmission aerial bema forming antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of aerial beam forming antennas is/are paired with the transmission aerial beam forming antennas," wherein using the same values adjusted for frequency differences reads on the pairing.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claim 35**, Kezys fails to expressly disclose feeding sections provided on feed lines of all or part of the plurality of adaptive beam forming array antennas, for employing a set of weights for transmitting a transmission wave via the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and

transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections provided on feed lines of all or part of the plurality of adaptive beam forming array antennas, for employing a set of weights for transmitting a transmission wave via the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves.".

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claims 36-38**, Kezys fails to expressly disclose feeding sections provided on feed lines of all or part of the plurality of adaptive null-forming array antennas, for employing a set of weights for transmitting a transmission wave via the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections provided on feed lines of all or part of the plurality of adaptive null-forming array antennas, for employing a set of weights for transmitting a transmission wave via

the feed line(s), the set of weights being obtained by correcting the particular set of weights in accordance with frequency differences between the transmission wave and the arriving waves."

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Regarding **claims 39-42**, Kezys fails to expressly disclose feeding sections for applying the particular set of weights to feeding line(s) of transmission array antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of adaptive null-forming array antennas is/are paired with the transmission array antennas.

In a similar field of endeavor, Lindskog et al disclose a system with a transformation function that can correct for coupling between the antenna elements and to compensate for any differences in carrier frequency between received signals and transmitted signals (see column 8, lines 61-67), which reads on the claimed, "feeding sections for applying the particular set of weights to feeding line(s) of transmission array antennas which is/are used for transmission of a transmission wave having a different frequency from frequencies of the arriving waves, wherein all or part of the plurality of array antennas is/are paired with the transmission array antennas," wherein using the same values adjusted for frequency differences reads on the pairing.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kezys with Lindskog et al to include the above correction for transmit versus receive frequencies in order to use the optimal weightings in a frequency division duplex system.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamaguchi (EP001014485A1) discloses an adaptive array antenna.

Pritchett (US005767807A) discloses a communication system and methods utilizing a reactively controlled directive array.

Ohira et al (US006407719B1) disclose an array antenna.

Petrus et al (US006839574B2) disclose a method and apparatus for estimating downlink beamforming weights in a communications system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan J. Fox whose telephone number is (571) 272-7908. The examiner can normally be reached on Monday through Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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October 2, 2005

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